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(71) Applicant(s)
Aqualisa Products Limited

(Incorporated in the United Kingdom)

**6 The Flyers Way, Westerham, Kent, TN16 1DE,
United Kingdom**

(72) Inventor(s)
Ian Beaumont

(74) Agent and/or Address for Service
J A Kemp & Co
14 South Square, Gray's Inn, LONDON, WC1R 5LX,
United Kingdom

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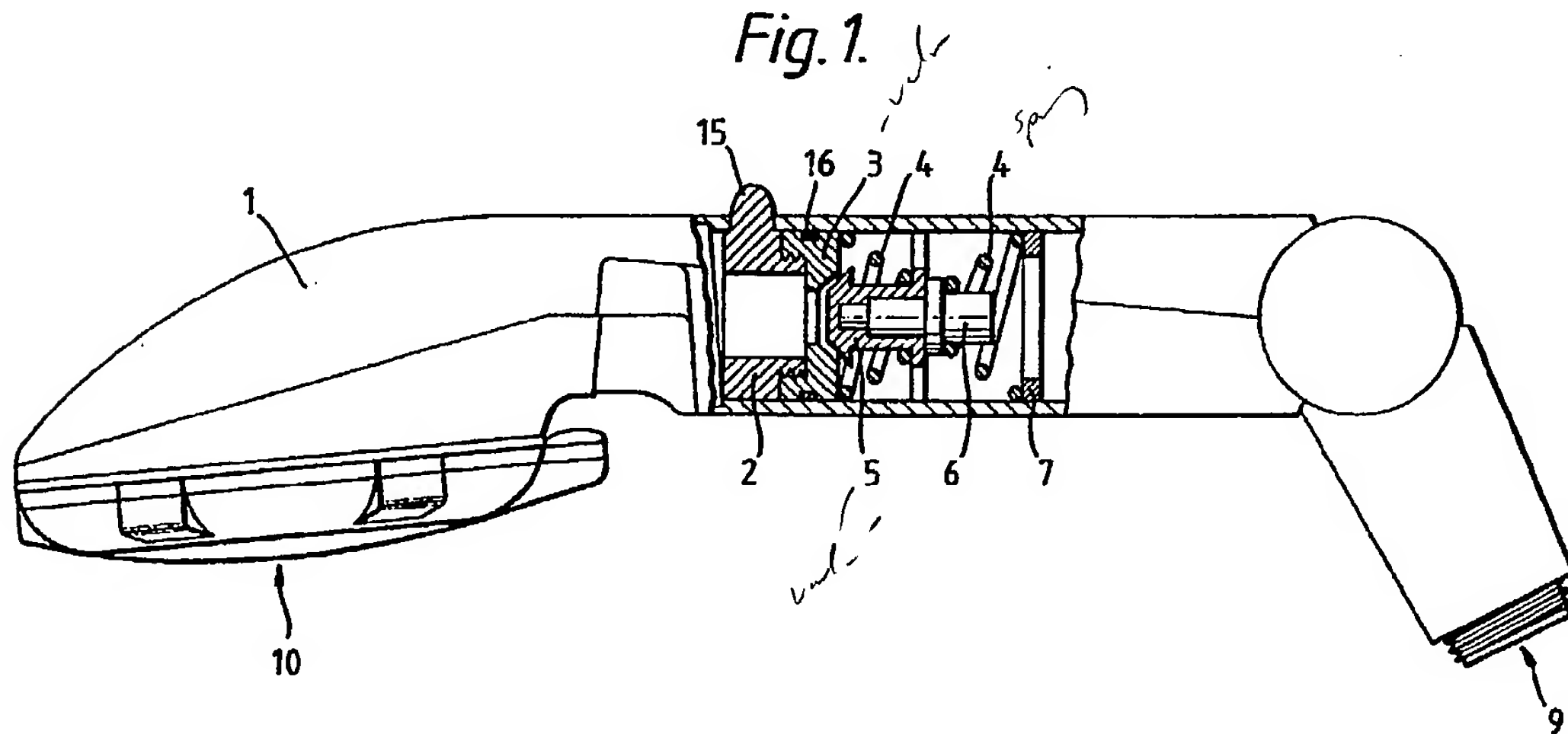
(56) Documents Cited
 EP 0487987 A2 US 5024378 A US 4778104 A
 US 4180208 A

(58) Field of Search
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INT CL⁵ F16K, G05D

(54) Anti-scald device

(57) A shower head (1) includes a temperature flow device containing temperature sensitive means (6) for sensing the temperature of water supplied to the shower head. The device also contains a valve (3, 5) operable to prevent the flow of water through the shower head. When the temperature of the water supplied to the shower head exceeds a threshold temperature value, the temperature sensitive means closes the valve. The threshold temperature at which the temperature sensitive means will operate is adjustable by adjusting the position of the valve seat (3) and with it the balance of spring means (4) between which the movable portion (5) of the valve is supported.

The temperature sensitive means (6) may include a wax element on a shape memory metal member.



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Fig. 1.

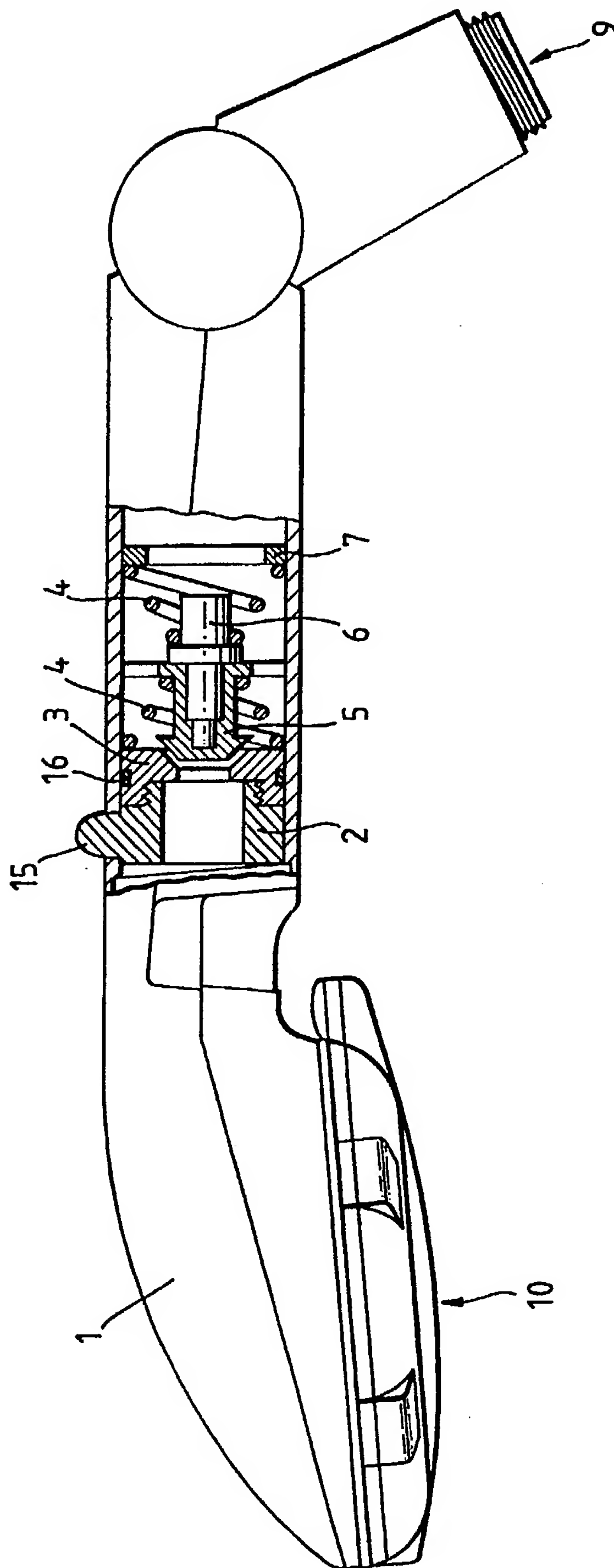


Fig. 2.

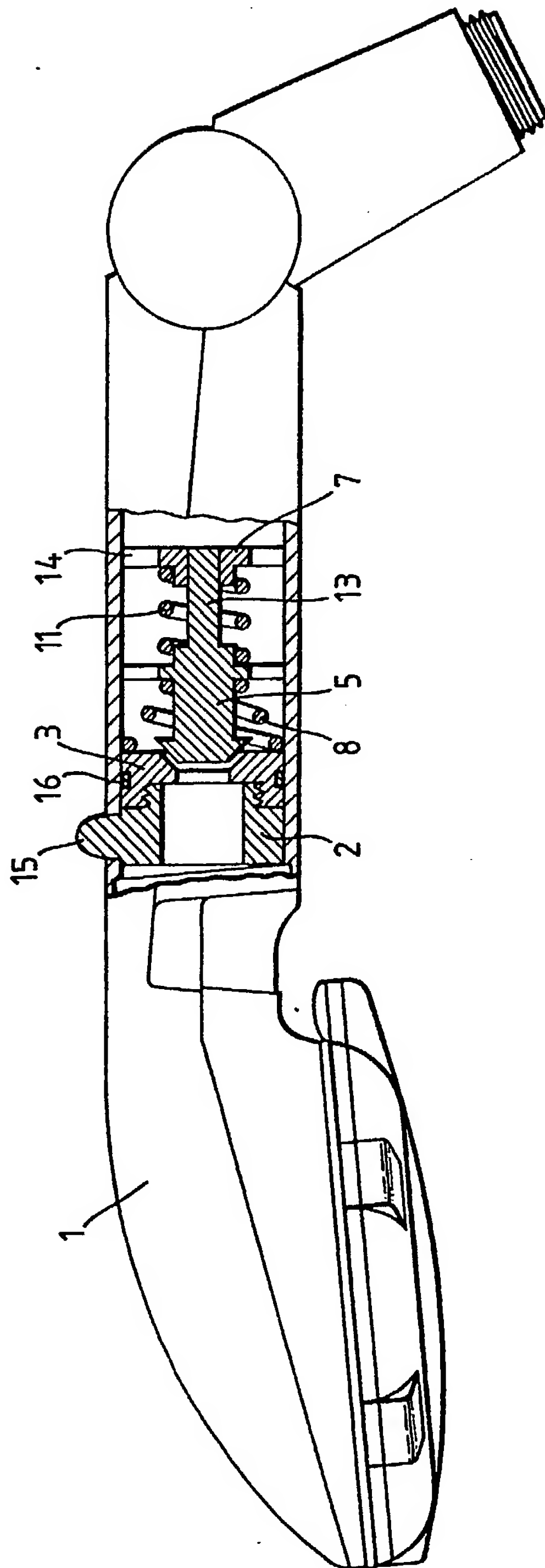
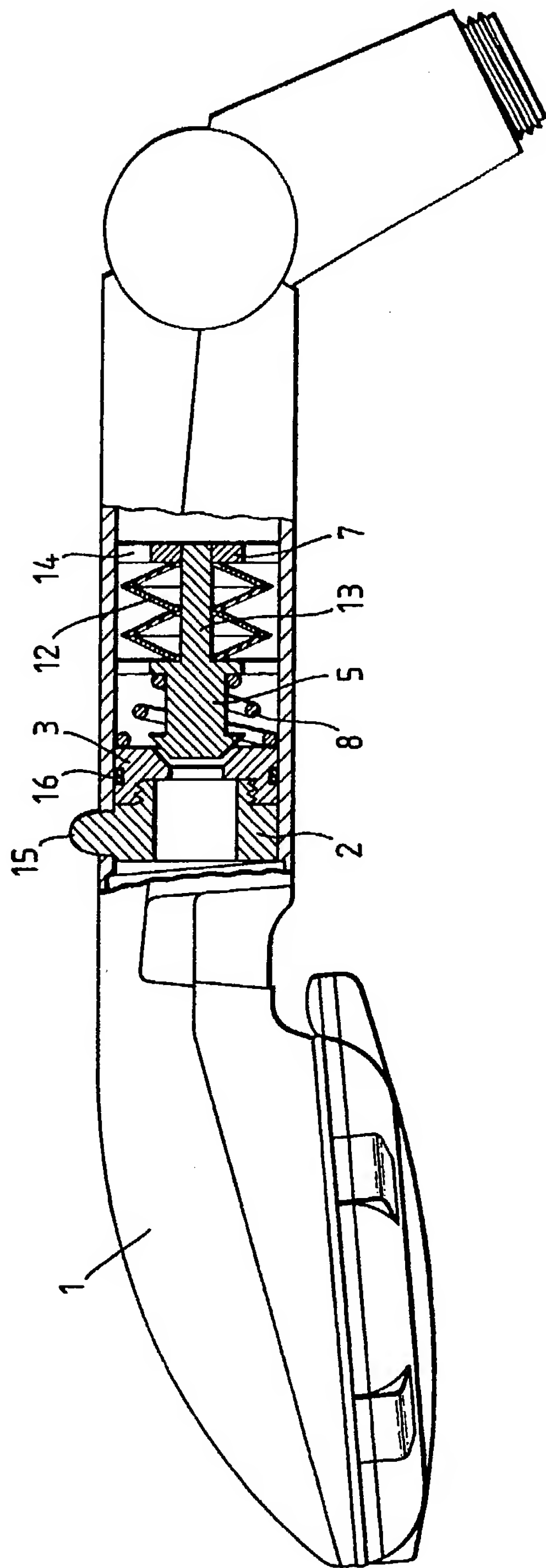


Fig. 3.



LIQUID FLOW DEVICE

The present invention relates to a liquid flow device for preventing the flow of a liquid when the
5 temperature of the liquid reaches a threshold value.

Most domestic shower attachments use a mixture of water from separate hot and cold water supplies. When one supply is interrupted, for instance by turning on another tap or flushing the toilet, the temperature of the
10 water supplied to the shower head can change dramatically, causing discomfort and, at worst, serious scalding.

The present invention aims to overcome this problem by providing a device which is capable of interrupting the water flow from the showerhead when the
15 water temperature reaches a threshold value. Accordingly, the present invention provides a liquid flow device comprising temperature sensitive means for sensing the temperature of liquid supplied to the device and flow restriction means operable substantially to prevent the
20 flow of liquid from the device, the temperature sensitive means being arranged to operate the flow restriction means, substantially to prevent liquid flow, when the temperature of the supplied liquid reaches a threshold value.

Generally the flow restriction means comprises
25 a valve which is arranged to be open in normal operation of the device and to be closed when the water temperature reaches the threshold temperature value. Preferably the

valve comprises a seat and a movable closure member, said movable closure member being associated with said temperature sensitive means to be moved thereby.

The temperature sensitive means is preferably positioned upstream of the flow restriction means. The temperature sensitive means generally changes in shape and/or size as the temperature of the surrounding liquid changes. Preferably the change in size and/or shape is reversible, in which case the temperature sensitive means returns to its original size when the water temperature falls below the threshold temperature. A temperature sensitive means which changes in size when it is heated may either expand or contract when it is heated, but preferably expands. Examples of temperature sensitive means which expand when heated include any thermally and chemically stable heat expandable material, such as a wax. Examples of temperature sensitive means which change shape when heated include bimetallic strips, memory metal springs and memory metal discs.

In one preferred embodiment, the temperature sensitive means is supported in a balanced position by biasing means. Preferably the biasing means comprises two compressed coil springs and said temperature sensitive means is positioned therebetween. In this embodiment, the threshold temperature at which the flow restriction means operates is adjustable by altering the balance of the biasing means. When the flow restriction means comprises a

valve having a moveable closure member and a seat, the threshold temperature may be adjusted by altering the position of the valve seat relative to the closure member to change the balance of the biasing means.

5 The balance of the biasing means and/or the position of the valve seat may be fixed before assembly of the device or means may be provided for adjusting the biasing means and/or the position of the valve seat after assembly of the device.

10 The present invention further provides a shower head which includes the liquid flow device. The shower head may be either fixed or hand held.

Embodiments of the invention will now be described, by way of example only, with reference to the
15 accompanying drawings, in which:

Figure 1 shows a shower head in side elevation, partially cut away to illustrate a first embodiment of a liquid flow device in accordance with the present invention;

20 Figure 2 is a similar view to Figure 1, illustrating a second embodiment of a liquid flow device;

Figure 3 is a similar view to Figure 1, illustrating a third embodiment of a liquid flow device.

Figure 1 shows a shower handset 1 provided with
25 a liquid flow cut off device which is arranged to limit the maximum liquid temperature at which the handset will operate. If the temperature of the blended water supplied

to the handset exceeds a threshold value, the device is arranged to shut off the liquid flow automatically.

In the illustrated embodiments the liquid flow device is incorporated into a shower head and the liquid is
5 water.

In the embodiment of Figure 1, when in use, blended water flows through the handset 1, from an inlet 9 to an outlet 10 and in so doing passes over a temperature sensitive means such as wax element 6, which is located in
10 a water passage between the inlet 9 and the outlet 10. The wax element 6 is supported in a balanced position by biasing means 4 and is associated with a moveable closure member. The wax element 6 expands as the temperature of the blended water passing around the wax element increases,
15 moving the moveable closure member 5 in an axial direction towards a valve seat 3. When the temperature of the blended water reaches the threshold value, the closure member 5 moves into contact with the seat 3 to shut off the flow of water through the handset 1.

20 In the embodiment of Figure 1, the biasing means take the form of two springs 4. One spring is positioned between the moveable closure member 5 and the valve seat 3. The other spring is positioned between the moveable closure member 5 and an annular ring 7 provided in
25 the water passage.

The threshold temperature is adjustable and is adjusted in use by rotating member 2, using an arm 15 which

extends through a wall of the handset. The rotary member 2 is engaged via a thread, with seat 3, causing rotary movement of member 2 to be translated into axial movement of valve seat 3. Valve seat 3 is provided with an O-ring seal 16 to seal against the inside surface of the handset 1. As the member 2 is rotated in one direction, seat 3 is moved axially towards the closure member 5, thus reducing the spacing between the closure member 5 and seat 3 and increasing the compression of springs 4. This has the effect of changing the threshold temperature of the device.

Alternatively, arm 15 can be replaced by a tamper-proof plain bush which allows the threshold temperature to be pre-selected on assembly of the handset.

In the embodiment of Figure 2, the temperature responsive means takes the form of a memory metal spring 11. In use, blended water flows through the handset 1 and passes over the memory metal spring 11, which is located in the water passage. At operating temperatures below the threshold temperature, the spring rates of the memory metal spring 11 and a balance spring 8 are similar, but as the water temperature increases towards the threshold temperature the memory metal spring 11 expands, moving the closure member 5 in an axial direction until it contacts the valve seat 3 to prevent further water flow.

A tail portion 13 of the closure member 5 is slidably received in an orifice provided in annular ring 7 to guide movement of the closure member 5 in the axial

direction. The annular ring 7 is supported in the flow passage of the handset 1 by radially extending arms 14.

The embodiment of Figure 3 is similar to that of Figure 2, but the memory metal spring 11 is replaced by 5 memory metal discs 12. Functions of the Figure 3 embodiment is similar to that of the Figure 2 embodiment.

CLAIMS

1. A liquid flow device comprising temperature sensitive means for sensing the temperature of liquid supplied to the device and flow restriction means operable substantially to prevent the flow of liquid from the device, the temperature sensitive means being arranged to operate the flow restriction means, substantially to prevent liquid flow, when the temperature of the supplied liquid reaches a threshold value.
2. A device according to claim 1, wherein the flow restriction means comprises a valve which is arranged to be open in normal operation of the device and to be closed when the water temperature reaches said threshold temperature value.
3. A device according to claim 2, wherein said valve comprises a seat and a movable closure member, said movable closure member being associated with said temperature sensitive means to be moved thereby.
4. A device according to claim 3, wherein the position of said valve seat is adjustable to adjust the threshold temperature at which the flow restriction means will be operated.
5. A device according to any one of the preceding claims, wherein the temperature sensitive means is provided upstream of the flow restriction means.
6. A device according to any one of the preceding claims, wherein the temperature sensitive means

is arranged to change in size as its temperature changes.

7. A device according to claim 6 wherein the temperature sensitive means is arranged to expand as its temperature increases.

5 8. A device according to any one of claims 3-7, wherein the moveable closure member is supported in a balanced position by biasing means.

9. A device according to claim 8 wherein the biasing means comprise two compressed coil springs and the
10 moveable closure member is positioned therebetween.

10. A device according to any one of claims 8 to 9 wherein the balance of said biasing means is adjustable to adjust the threshold temperature at which the flow restriction means is operated.

15 11. A device according to claim 10, when dependent on claim 4, wherein the balance of said biasing means is adjustable by adjusting the position of said valve seat.

12. A device according to claim 11 wherein
20 means are provided for adjusting the position of said valve seat after assembly of the device.

13. A device according to any one of claims 9 to 12, wherein the temperature sensitive means is positioned between the coil springs.

25 14. A device according to any one of the preceding claims wherein the temperature sensitive means is a wax element.

15. A device according to any of claims 9 to 12 wherein one of the biasing means is also the temperature sensitive means.

5 16. A device according to any of claims 1 to 12 and 15 wherein the temperature sensitive means is a memory metal spring.

17. A device according to any of claims 1 to 12 and 15 wherein the temperature sensitive means is a memory metal disc.

10 18. A device according to any of the preceding claims, wherein the device is hand-held.

19. A device according to any of the preceding claims, wherein the device is a shower head.

15 20. A shower head including a liquid flow device according to any one of claims 1 to 17.

21. A liquid flow device substantially as described herein with reference to the accompanying drawings.

20 22. A shower head substantially as described herein with reference to the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

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Relevant Technical fields

(i) UK Cl (Edition L) F2V (VS30, VV13)

(ii) Int Cl (Edition 5) F16K, G05D

Search Examiner

PAM HYETT

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

12 MARCH 1993

Documents considered relevant following a search in respect of claims 1-22

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	EP 0487987 A2 (PIZZEY) - see particularly column 6 lines 11-24	1-3, 6-10, 13, 14
X	US 5024378 (BERGMANN)	1-3, 5-8, 10, 14
X	US 4778104 (FISHER)	1-3, 5, 8-10, 15, 16, 18
X	US 4180208 (OBERMAIER) - see particularly column 4 lines 47-57 and Figure 2	1-11, 13, 14, 18

Category	Identity of document and relevant passages - 11 -	Relevant to claim

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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